

A

(New Application Transmittal [4-1]—page 1 of 11)

1. Type of Application

This new application is for a(n)

(check one applicable item below)

- ☒ Original (nonprovisional)
☐ Design
☐ Plant

WARNING: Do not use this transmittal for a completion in the U.S. of an International Application under 35 U.S.C. § 371(c)(4), unless the International Application is being filed as a divisional, continuation or continuation-in-part application.

WARNING: Do not use this transmittal for the filing of a provisional application.

NOTE: If one of the following 3 items apply, then complete and attach ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF A PRIOR U.S. APPLICATION CLAIMED and a NOTIFICATION IN PARENT APPLICATION OF THE FILING OF THIS CONTINUATION APPLICATION.

- ☐ Divisional.
☐ Continuation.
☐ Continuation-in-part (C-I-P).

2. Benefit of Prior U.S. Application(s) (35 U.S.C. §§ 119(e), 120, or 121)

NOTE: A nonprovisional application may claim an invention disclosed in one or more prior filed copending nonprovisional applications or copending international applications designating the United States of America. In order for a nonprovisional application to claim the benefit of a prior filed copending nonprovisional application or copending international application designating the United States of America, each prior application must name as an inventor at least one inventor named in the later filed nonprovisional application and disclose the named inventor's invention claimed in at least one claim of the later filed nonprovisional application in the manner provided by the first paragraph of 35 U.S.C. § 112. Each prior application must also be:

(i) An international application entitled to a filing date in accordance with PCT Article 11 and designating the United States of America; or

(ii) Complete as set forth in § 1.51(b); or

(iii) Entitled to a filing date as set forth in § 1.53(b) or § 1.53(d) and include the basic filing fee set forth in § 1.16; or

(iv) Entitled to a filing date as set forth in § 1.53(b) and have paid therein the processing and retention fee set forth in § 1.21(f) within the time period set forth in § 1.53(f).

37 C.F.R. § 1.78(a)(1).

NOTE: If the new application being transmitted is a divisional, continuation or a continuation-in-part of a parent case, or where the parent case is an International Application which designated the U.S., or benefit of a prior provisional application is claimed, then check the following item and complete and attach ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

WARNING: If an application claims the benefit of the filing date of an earlier filed application under 35 U.S.C. §§ 120, 121 or 365(c), the 20-year term of that application will be based upon the filing date of the earliest U.S. application that the application makes reference to under 35 U.S.C. §§ 120, 121 or 365(c). (35 U.S.C. § 154(a)(2) does not take into account, for the determination of the patent term, any application on which priority is claimed under 35 U.S.C. §§ 119, 365(a) or 365(b).) For a c-i-p application, applicant should review whether any claim in the patent that will issue is supported by an earlier application and, if not, the applicant should consider canceling the reference to the earlier filed application. The term of a patent is not based on a claim-by-claim approach. See Notice of April 14, 1995, 60 Fed. Reg. 20,195, at 20,205.

[illegible]

- ### 3. Papers Enclosed

- 6 Sheets of drawing

NOTE: "Identifying indicia, if provided, should include the application number or the title of the invention, inventor's name, docket number (if any), and the name and telephone number of a person to call if the Office is unable to match the drawings to the proper application. This information should be placed on the back of each sheet of drawing a minimum distance of 1.5 cm. (5/8 inch) down from the top of the page . . ." 37 C.F.R. § 1.84(c).

☐ **informal**

_____ Other

Citations

- ☐ Declaration of Biological Deposit
- ☐ Submission of "Sequence Listing," computer readable copy and/or amendment pertaining thereto for biotechnology invention containing nucleotide and/or amino acid sequence.
- ☐ Authorization of Attorney(s) to Accept and Follow Instructions from Representative
- ☐ Special Comments
- ☐ Other

5. Declaration or oath (including power of attorney)

NOTE: A newly executed declaration is not required in a continuation or divisional application provided that the prior nonprovisional application contained a declaration as required, the application being filed is by all or fewer than all the inventors named in the prior application, there is no new matter in the application being filed, and a copy of the executed declaration filed in the prior application (showing the signature or an indication thereon that it was signed) is submitted. The copy must be accompanied by a statement requesting deletion of the names of person(s) who are not inventors of the application being filed. If the declaration in the prior application was filed under § 1.47, then a copy of that declaration must be filed accompanied by a copy of the decision granting § 1.47 status or, if a nonsigning person under § 1.47 has subsequently joined in a prior application, then a copy of the subsequently executed declaration must be filed. See 37 C.F.R. §§ 1.63(d)(1)-(3).

NOTE: A declaration filed to complete an application must be executed, identify the specification to which it is directed, identify each inventor by full name including family name and at least one given name, without abbreviation together with any other given name or initial, and the residence, post office address and country or citizenship of each inventor, and state whether the inventor is a sole or joint inventor. 37 C.F.R. § 1.63(a)(1)-(4).

- ☐ Enclosed

Executed by

(check all applicable boxes)

- ☐ inventor(s).
- ☐ legal representative of inventor(s).
37 C.F.R. §§ 1.42 or 1.43.
- ☐ joint inventor or person showing a proprietary interest on behalf of inventor who refused to sign or cannot be reached.
 - ☐ This is the petition required by 37 C.F.R. § 1.47 and the statement required by 37 C.F.R. § 1.47 is also attached. See item 13 below for fee.

- ☒ Not Enclosed.

NOTE: Where the filing is a completion in the U.S. of an International Application or where the completion of the U.S. application contains subject matter in addition to the International Application, the application may be treated as a continuation or continuation-in-part, as the case may be, utilizing ADDED PAGE FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION CLAIMED.

- ☒ Application is made by a person authorized under 37 C.F.R. § 1.41(c) on behalf of all the above named inventor(s).

(The declaration or oath, along with the surcharge required by 37 C.F.R. § 1.16(e) can be filed subsequently).

- ☐ Showing that the filing is authorized.
(not required unless called into question. 37 C.F.R. § 1.41(d))

6. Inventorship Statement

WARNING: If the named inventors are each not the inventors of all the claims an explanation, including the ownership of the various claims at the time the last claimed invention was made, should be submitted.

The inventorship for all the claims in this application are:

☐ The same.

or

☐ Not the same. An explanation, including the ownership of the various claims at the time the last claimed invention was made,

☐ is submitted.

☐ will be submitted.

7. Language

NOTE: An application including a signed oath or declaration may be filed in a language other than English. An English translation of the non-English language application and the processing fee of \$130.00 required by 37 C.F.R. § 1.17(k) is required to be filed with the application, or within such time as may be set by the Office. 37 C.F.R. § 1.52(d).

☒ English

☐ Non-English

☐ The attached translation includes a statement that the translation is accurate. 37 C.F.R. § 1.52(d).

8. Assignment

☒ An assignment of the invention to Nokia Mobile Phones Limited

☐ is attached. A separate ☐ "COVER SHEET FOR ASSIGNMENT (DOCUMENT) ACCOMPANYING NEW PATENT APPLICATION" or ☐ FORM PTO 1595 is also attached.

☒ will follow.

NOTE: "If an assignment is submitted with a new application, send two separate letters—one for the application and one for the assignment." Notice of May 4, 1990 (1114 O.G. 77-78).

WARNING: A newly executed "CERTIFICATE UNDER 37 C.F.R. § 3.73(b)" must be filed when a continuation-in-part application is filed by an assignee. Notice of April 30, 1993, 1150 O.G. 62-64.

(New Application Transmittal [4-1]—page 5 of 11)

9. Certified Copy

Certified copy(ies) of application(s)

Country	Appln. No.	Filed
United Kingdom	GB 9904013.1	22 February 1999
Country	Appln. No.	Filed
Country	Appln. No.	Filed

from which priority is claimed

☒ Is (are) attached.☐ will follow.

NOTE: The foreign application forming the basis for the claim for priority must be referred to in the oath or declaration. 37 C.F.R. § 1.55(a) and 1.63.

NOTE: This item is for any foreign priority for which the application being filed directly relates. If any parent U.S. application or International Application from which this application claims benefit under 35 U.S.C. § 120 is itself entitled to priority from a prior foreign application, then complete item 18 on the ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

10. Fee Calculation (37 C.F.R. § 1.16)**A. ☒ Regular application**

CLAIMS AS FILED				
Number filed	Number Extra		Rate	Basic Fee 37 C.F.R. § 1.16(a) \$ 690.00
Total Claims (37 C.F.R. § 1.16(c))	10	— 20 =	0 × \$ 18.00	0
Independent Claims (37 C.F.R. § 1.16(b))	3	— 3 =	0 × \$ 78.00	0
Multiple dependent claim(s), If any (37 C.F.R. § 1.16(d))			+ \$260.00	

- ☐ Amendment cancelling extra claims is enclosed.
☐ Amendment deleting multiple-dependencies is enclosed.
☐ Fee for extra claims is not being paid at this time.

NOTE: If the fees for extra claims are not paid on filing they must be paid or the claims cancelled by amendment, prior to the expiration of the time period set for response by the Patent and Trademark Office in any notice of fee deficiency. 37 C.F.R. § 1.16(d).

Filing Fee Calculation \$ 690.00

B. ☐ Design application
(\$310.00—37 C.F.R. § 1.16(f))

Filing Fee Calculation \$

C. ☐ Plant application
(\$480.00—37 C.F.R. § 1.16(g))

Filing fee calculation \$

11. Small Entity Statement(s)

- ☐ Statement(s) that this is a filing by a small entity under 37 C.F.R. § 1.9 and 1.27 is (are) attached.

WARNING: "Status as a small entity must be specifically established in each application or patent in which the status is available and desired. Status as a small entity in one application or patent does not affect any other application or patent, including applications or patents which are directly or indirectly dependent upon the application or patent in which the status has been established. The refiling of an application under § 1.53 as a continuation, division, or continuation-in-part (including a continued prosecution application under § 1.53(d)), or the filing of a reissue application requires a new determination as to continued entitlement to small entity status for the continuing or reissue application. A nonprovisional application claiming benefit under 35 U.S.C. § 119(e), 120, 121, or 365(c) of a prior application, or a reissue application may rely on a statement filed in the prior application or in the patent if the nonprovisional application or the reissue application includes a reference to the statement in the prior application or in the patent or includes a copy of the statement in the prior application or in the patent and status as a small entity is still proper and desired. The payment of the small entity basic statutory filing fee will be treated as such a reference for purposes of this section." 37 C.F.R. § 1.28(a)(2).

WARNING: "Small entity status must not be established when the person or persons signing the . . . statement can unequivocally make the required self-certification." M.P.E.P., § 509.03, 6th ed., rev. 2, July 1996 (emphasis added).

(complete the following, if applicable)

- ☐ Status as a small entity was claimed in prior application _____ / _____, filed on _____, from which benefit is being claimed for this application under:

35 U.S.C. § ☐ 119(e),
☐ 120,
☐ 121,
☐ 365(c),

and which status as a small entity is still proper and desired.

- ☐ A copy of the statement in the prior application is included.

Filing Fee Calculation (50% of A, B or C above)

\$ _____

NOTE: Any excess of the full fee paid will be refunded if small entity status is established and a refund request are filed within 2 months of the date of timely payment of a full fee. The two-month period is not extendable under § 1.136. 37 C.F.R. § 1.28(a).

12. Request for International-Type Search (37 C.F.R. § 1.104(d))

(complete, if applicable)

- ☐ Please prepare an international-type search report for this application at the time when national examination on the merits takes place.

13. Fee Payment Being Made at This Time

☐ Not Enclosed

☐ No filing fee is to be paid at this time.

(This and the surcharge required by 37 C.F.R. § 1.16(e) can be paid subsequently.)

☒ Enclosed

☒ Filing fee

\$ 690.00

☐ Recording assignment

(\$40.00; 37 C.F.R. § 1.21(h))

(See attached "COVER SHEET FOR
ASSIGNMENT ACCOMPANYING NEW
APPLICATION".)

\$ _____

☐ Petition fee for filing by other than all the
inventors or person on behalf of the inventor
where inventor refused to sign or cannot be
reached

(\$130.00; 37 C.F.R. §§ 1.47 and 1.17(l))

\$ _____

☐ For processing an application with a
specification in

a non-English language

(\$130.00; 37 C.F.R. §§ 1.52(d) and 1.17(k))

\$ _____

☐ Processing and retention fee

(\$130.00; 37 C.F.R. §§ 1.53(d) and 1.21(l))

\$ _____

☐ Fee for international-type search report

(\$40.00; 37 C.F.R. § 1.21(e))

\$ _____

NOTE: 37 C.F.R. § 1.21(l) establishes a fee for processing and retaining any application that is abandoned for failing to complete the application pursuant to 37 C.F.R. § 1.53(f) and this, as well as the changes to 37 C.F.R. §§ 1.53 and 1.78(a)(1), indicate that in order to obtain the benefit of a prior U.S. application, either the basic filing fee must be paid, or the processing and retention fee of § 1.21(l) must be paid, within 1 year from notification under § 53(f).

Total fees enclosed

\$ 690.00

14. Method of Payment of Fees

☒ Check in the amount of \$ 690.00

☐ Charge Account No. _____ in the amount of
\$ _____

A duplicate of this transmittal is attached.

NOTE: Fees should be itemized in such a manner that it is clear for which purpose the fees are paid. 37 C.F.R. § 1.22(b).

15. Authorization to Charge Additional Fees

WARNING: If no fees are to be paid on filing, the following items should not be completed.

WARNING: Accurately count claims, especially multiple dependent claims, to avoid unexpected high charges, if extra claim charges are authorized.

- ☒ The Commissioner is hereby authorized to charge the following additional fees by this paper and during the entire pendency of this application to Account No. 16-1350:

☒ 37 C.F.R. § 1.16(a), (f) or (g) (filing fees)

☒ 37 C.F.R. § 1.16(b), (c) and (d) (presentation of extra claims)

NOTE: Because additional fees for excess or multiple dependent claims not paid on filing or on later presentation must only be paid or these claims cancelled by amendment prior to the expiration of the time period set for response by the PTO in any notice of fee deficiency (37 C.F.R. § 1.16(d)), it might be best not to authorize the PTO to charge additional claim fees, except possibly when dealing with amendments after final action.

☒ 37 C.F.R. § 1.16(e) (surcharge for filing the basic filing fee and/or declaration on a date later than the filing date of the application)

☒ 37 C.F.R. § 1.17(a)(1)–(5) (extension fees pursuant to § 1.136(a)).

☐ 37 C.F.R. § 1.17 (application processing fees)

NOTE: ". . . A written request may be submitted in an application that is an authorization to treat any concurrent or future reply, requiring a petition for an extension of time under this paragraph for its timely submission, as incorporating a petition for extension of time for the appropriate length of time. An authorization to charge all required fees, fees under § 1.17, or all required extension of time fees will be treated as a constructive petition for an extension of time in any concurrent or future reply requiring a petition for an extension of time under this paragraph for its timely submission. Submission of the fee set forth in § 1.17(a) will also be treated as a constructive petition for an extension of time in any concurrent reply requiring a petition for an extension of time under this paragraph for its timely submission." 37 C.F.R. § 1.136(a)(3).

☐ 37 C.F.R. § 1.18 (issue fee at or before mailing of Notice of Allowance, pursuant to 37 C.F.R. § 1.311(b))

NOTE: Where an authorization to charge the issue fee to a deposit account has been filed before the mailing of a Notice of Allowance, the issue fee will be automatically charged to the deposit account at the time of mailing the notice of allowance. 37 C.F.R. § 1.311(b).

NOTE: 37 C.F.R. § 1.28(b) requires "Notification of any change in status resulting in loss of entitlement to small entity status must be filed in the application . . . prior to paying, or at the time of paying, . . . the issue fee. . . ." From the wording of 37 C.F.R. § 1.28(b), (a) notification of change of status must be made even if the fee is paid as "other than a small entity" and (b) no notification is required if the change is to another small entity.

(New Application Transmittal [4-1]—page 9 of 11)

16. Instructions as to Overpayment

NOTE: "... Amounts of twenty-five dollars or less will not be returned unless specifically requested within a reasonable time, nor will the payer be notified of such amounts; amounts over twenty-five dollars may be returned by check or, if requested, by credit to a deposit account." 37 C.F.R. § 1.26(a).

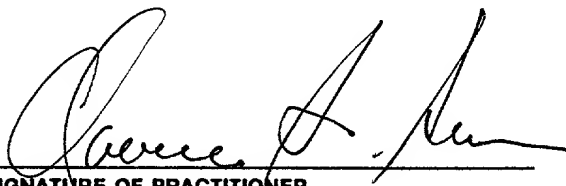
- ☒ Credit Account No. 16-1350
☐ Refund

SEND ALL CORRESPONDENCE TO:

Reg. No. 24,622

Tel. No. (203) 259-1800

Customer No.



SIGNATURE OF PRACTITIONER

Clarence A. Green

(type or print name of attorney)

PERMAN & GREEN, LLP

P.O. Address

425 Post Road, Fairfield, Connecticut 06430

☐ **Incorporation by reference of added pages**

(check the following item if the application in this transmittal claims the benefit of prior U.S. application(s) (including an international application entering the U.S. stage as a continuation, divisional or C-I-P application) and complete and attach the ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED)

- ☐ Plus Added Pages for New Application Transmittal Where Benefit of Prior U.S. Application(s) Claimed

Number of pages added _____

- ☐ Plus Added Pages for Papers Referred to in Item 4 Above

Number of pages added _____

- ☐ Plus added pages deleting names of inventor(s) named in prior application(s) who is/are no longer inventor(s) of the subject matter claimed in this application.

Number of pages added _____

- ☐ Plus "Assignment Cover Letter Accompanying New Application"

Number of pages added _____

☒ **Statement Where No Further Pages Added**

(if no further pages form a part of this Transmittal, then end this Transmittal with this page and check the following item)

- ☒ This transmittal ends with this page.

PAT 99305 US

A communication terminal having a predictive editor application.

Background of the Invention

The invention relates to a communication terminal having a predictive editor application for entering and editing data. Such a terminal can be a cellular or cordless phone or a communicator. The editor is used for editing text for message handling, phonebook editing and searching etc.

Tegic Communications, Inc has developed an intelligent software protocol that allows the users to enter ambiguous key strokes into an electronic device. The predictive editor program, named T9®, automatically determines from all the possible matches, the intended word. The predictive editor program matches entered keystrokes with completed words from a linguistic database. This concept is subject for US 5.818.437 and WO 98/33111.

Summary of the Invention

An object of the invention is to provide a communication terminal using the predictive editor program allowing the user in an easy way to also handle the most common names of person the user communicates with.

This object is achieved by a communication terminal having a display; a keypad having a plurality of keys associated with several letters each; processor means controlling the display means in accordance with the operation of the keypad; a predictive editor program for generating an output containing word matching a received string of ambiguous key strokes. The predictive editor program has a number of associated vocabularies including at least one language dependent dictionary and at least one dictionary receiving user defined inputs. An editor application controlled by the processor means communicates with said predictive editor programs for generating matching words based on an ambiguous string of key strokes.

Second memory means of the communication terminal is used for storing user inputted data. The processor means automatically searches said second memory means for words and copies these word into said at least one dictionary for receiving user defined inputs and associated with said predictive editor program. Hereby data available in an electronical phonebook database will automatically be copied into the user defined dictionary even though this data was not entered by using the predictive editor program. Also data coming from a new SIM card may enter the user defined dictionary by this concept.

The invention furthermore relates to a communication terminal having a display; a keypad having a plurality of keys associated with several letters each; processor means controlling the display means in accordance with the operation of the keypad; a selectable predictive editor program for generating an output containing word matching a received string of ambiguous key strokes, said predictive editor program has a number of associated vocabularies including at least one language dependent dictionary and at least one dictionary receiving user defined inputs. An editor application controlled by the processor means communicates with said predictive editor programs for generating matching words based on an ambiguous string of key strokes, said editor application stores words that have to be entered in an unambiguous way in one of said least one dictionary receiving user defined inputs. The processor means associates a storing time for the unambiguous entered words stored in dictionary receiving user defined inputs; and the processor means maintains the dictionary containing the unambiguously entered words in accordance with the storing time. The user defined dictionary will hereby delete seldomly used words when the memory becomes full.

The invention does furthermore relate to a communication terminal with a keypad having a key for requesting the processor to replace said one word

from the list of matching words, and said processor handled this list of matching words as and endless loop. Hereby alternative matches becomes available in an easy way.

The invention does furthermore relate to a communication terminal with a keypad having a key for requesting input of a special sign from a list of special signs in the text string, and wherein the keypad has a key for requesting the processor to replace a special sign with the next special sign from the list of special signs, and said processor handled this list of special signs as and endless loop. Hereby alternative special signs become available in an easy way.

Finally the invention relates to a communication terminal having an editor application that opens a word for editing with the predictive editor program when a cursor is placed at the beginning or the end of the word, whereby the editor application regenerates a sequence of key strokes based on the presently displayed match, and whereby the editor application adds new key strokes to the regenerated sequence of key strokes in dependence of the position of the cursor and the key pressed. the editor is hereby able to regenerate the sequence of key strokes and the user does not have to re-enter the full word when he wants to add a new beginning or ending to the word.

Brief Description of the Drawing

For a better understanding of the present invention and to understand how the same may be brought into effect reference will now be made, by way of example only, to accompanying drawings, in which:-

Fig. 1 schematically illustrates a preferred embodiment of a hand portable phone according to the invention.

Fig. 2 schematically shows the essential parts of a telephone for communication with a cellular or cordless network.

FIG. 3 shows the major components of the predictive editor according to a preferred embodiment of the invention.

FIG. 4 shows the architecture of the ambiguity eliminating software according to a preferred embodiment of the invention.

Fig. 5 schematically illustrates an alternative embodiment of a hand portable phone according to the invention.

Fig. 6 illustrates a sequence of displays illustrating the text entry according to the invention .

Fig. 7 schematically illustrates a further alternative embodiment of a hand portable phone according to the invention.

Fig. 8 illustrates a sequence of displays illustrating the handling no matching words according to the invention.

Fig. 9 illustrates a sequence of displays illustrating the handling of a compound word according to the invention.

Fig.10 illustrates a sequence of displays illustrating the text clearing according to the invention.

Fig. 11 illustrates a flow diagram for the editor application according to the invention.

Detailed Description of the invention

Fig. 1 shows a preferred embodiment of a phone according to the invention, and it will be seen that the phone, which is generally designated by 1, comprises a user interface having a keypad 2, a display 3, an on/off button 4 (fig. 3), a speaker 5 (only openings are shown in fig. 1), and a microphone 6 (only openings are shown in fig. 1). The phone 1 according to the preferred embodiment is adapted for communication via a cellular network, but could have been designed for a cordless network as well.

According to the preferred embodiment the keypad 2 has a first group 7 of keys as alphanumeric keys, a soft key 8, and a navigation key 10. Furthermore the keypad includes a "clear" key 9. The present functionality of the soft key 8 is shown in a separate field in the display 3 just above the key 8. This key layout is characteristic of the Nokia 3110™ phone and the Nokia 5110™ phone.

The phone 1 has an inner housing of which gripping areas 23 are visible. An exchangeable front cover 21 and rear cover 22 are snapped onto the inner housing.

Fig. 2 schematically shows the most important parts of a preferred embodiment of the phone, said parts being essential to the understanding of the invention. The preferred embodiment of the phone of the invention is adapted for use in connection with the GSM 900MHz and GSM 1800 MHz network, but, of course, the invention may also be applied in connection with other phone networks. The processor 18 controls the communication with the network via the transmitter/receiver circuit 19 and an antenna 20 that will be discussed in details below.

The microphone 6 transforms the user's speech into analog signals, the signals formed thereby are A/D converted in an A/D converter (not shown) before the speech is encoded in an audio part 14. The encoded speech signal is transferred to the processor 18, which i.a. supports the GSM terminal software. The processor 18 also forms the interface to the peripheral units of the apparatus, including a RAM memory 17a and a Flash ROM memory 17b, a SIM card 16, the display 3 and the keypad 2 (as well as data, power supply, etc.). The audio part 14 speech-decodes the signal, which is transferred from the processor 18 to the earpiece 5 via a D/A converter (not shown).

Basic Operation of the predictive editor.

FIG. 3 shows the major components of the predictive editor according to the invention. The man-machine interface is established by the display 3 and the keyboard 2. The processor 18 executes instructions and reads and writes data from a memory 17. Software instructions in the memory 17 include an operating system 40, a disambiguation program 42 and its vocabularies 41, and optionally one or more application programs 43, 44.

Target applications programs 43, 44 for the predictive editor used in a handset include the electronic phone book memory, notepad, messages, calendar, and internet browsing.

According to the preferred embodiment of the invention the predictive editor will be used as an alternative together with the standard text editor used in handsets. This standard editor is also based on a plurality of keys each associated with several letters. However the individual letter is selected by multi-pressing the key in question.

Data is entered on the keypad 2 which comprises of individual alpha-numerical keys 7. Most of these keys 7 have multiple meanings, represented

by letter, numbers and symbols printed on the keys. The entered text is shown in the display 3 of the phone. The text already entered (and accepted by the user) is shown in the same text format as the standard display format of the phone. The word presently being entered is underlined or reversed in colors in order to indicate that the letter string has not been fixed yet. The predictive editor is able to interpret individual keys and multiple key sequences in several ways simultaneously.

A selection list 50 lists the various interpretations and options. A selection key 51 steps through items in the selection list 50, allowing the user successively to replace the displayed candidate with the following candidate on the list 50. The list 50 is handled as an endless loop whereby the originally displayed candidate is displayed again when the user has scrolled through the other items on the list by using selection key 51. The candidate is selected by pressing a spacer key 53.

System Architecture

FIG. 4 shows the architecture of the disambiguating software. An input from a keypad 2 is processed in an input manager 60. Input data is via internal bus means 64 passed to a processing module 61, which keeps a record of the current key sequence until the user has accepted a word based on this sequence by pressing the space key 52. When a key stroke has been received by processing module 61, the current key sequence is communicated via internal bus means 64 to a prediction processor 62, which forwards the sequence to one or more modules 41 acting as electronic vocabularities.

The vocabulary modules 41a, 41b, 41c, ...41N work in parallel and respond individually if they contain data matching the current key stroke sequence. One vocabulary module 41a might include a dictionary containing words in a

language, e.g. English, defined by the user and used as editing language. According to the preferred embodiment some of the vocabulary modules 41a, 41b, 41c, ...41N may contain personalized user defined words, e.g entered by using the standard editor of the phone (when the predictive editor did not find the word the user was looking for) or by copying the names from the phonebook into one of the vocabulary modules. In the preferred embodiment vocabulary module 41b and 41c contains the word entered by the standard editor and word copied from the phonebook, respectively.

The vocabulary modules 41a, 41b, 41c, ...41N often supply a plurality of matching word – either being displayed or available through the selection list 50. The prediction processor 62 accumulates a complete list of matching words for the selection list 50 from all vocabulary modules 41a, 41b, 41c, ...41N. When prediction processor 62 has finalized the processing, the processing module 61 transfers the selection list 50 to a display manager 63 and the display 3 via the internal bus means 64.

In the most cases, the disambiguation software will work as an editor server and therefore pass data strings directly to another client or application program 43, 44 running on the processor 18, too. In this case the keypad 2, the input processor 60 and the display manager 63 will be integrated in the application program 43, 44 using the predictive editor as a server. These applications may include the electronic phone book memory, notepad, messages, calendar, and internet browsing.

Vocabulary look-up processing.

Vocabulary look-up processing is handled by a computer program being available on the market today. Therefore these parts will not be discribed further. Both the disambiguation software and the basic dictionaries in a plurality of languages are available from Tegic Communications, Inc. under

the tradename T9. As well the disambiguation software and the basic dictionaries (e.g. the English one) requires 100 kbyte memory space each. The basic dictionaries are compressed in order to reduce the memory requirements. The user defined directories are less memory consuming and only requires 2-4 kbyte each according to the preferred embodiment. These dictionaries are not compressed and work advantageously according to the first in first out principle.

Userinterface for the predictive editor program.

The preferred embodiment of the predictive text input according to the invention will be based on Tegic's T9 technology. The core functionality of T9 is as discussed above its ability to generate the intended text onto the screen from ambiguous keystrokes entered on a phone keypad, requiring only one keystroke per letter. This provides a more efficient method of entering text than the traditional multi-tap method requiring many more keystrokes per letter due to the multiple mappings of letters to a given key.

The predictive editor program makes this possible because it is based on a large intelligent dictionary that allows the editor to predict what word the user intended based on the number of key-presses and combination of key-presses. Often several words will match the keystrokes that are input and the user chooses the desired match from those offered by the predictive editor program.

While the phone in fig. 1 had only a single soft key, the phone in fig. 5 is equipped with two soft keys. Fig. 5 shows an alternative embodiment of a phone according to the invention. The major difference between the two phones shown in fig. 1 and 5, respectively, is the keys in the keypad and as it will be explained later the soft key functionality labels displayed in the display

3. The same referral numbers are used in fig. 1 and 5 for items having similar functionality.

According to the alternative embodiment the keypad 2 has a first group 7 of keys as alphanumeric keys, two soft keys 24 and 25, and a navigation key 28 having the same functionality as the navigation key 10 but placed centrally below the display 3. Furthermore the keypad and off-hook key 30 and an on-hook key 31. The present functionality of the soft key 24 and 25 is shown in separate fields in the display 3 adjacent to said keys. This key layout is characteristic of the Nokia 2110™ phone and the Nokia 6110™ phone.

With reference to fig. 6 a display sequence illustrating the basic operation of the text input based on the predictive editor program for the embodiment illustrated in fig. 5. In the initial display (the first display), a cursor 70 indicates that the editor is ready for a “new” word to be typed to the editor. Above the text area an icon 71 indicates the status of the phone (spelling) based on the predictive editor program. Furthermore the two softkey labels 72 and 73 indicates that the functionality of the softkeys during this are “options” and “back”. When pressing the “back” softkey 24 the phone leaves the text editing mode and jumps one step up in the menu structure. When pressing the “options” softkey 25 the user is offered a list of actions as “send the text as an SMS”, “save the text”, “clear the display” and “switch between predictive editor and multi tap editor (the traditional text editor of a phone)”. Furthermore the “options” softkey 25 will provide the user with some editing tools that will be discussed later on.

When the phone only has one softkey 8 as shown in fig. 1, the softkey 8 will have the functionality “options”, while the “back” functionality is handled by the clear key 9.

1	65	2 - abc	3 - def
---	----	---------	---------


4 - ghi	5 - jkl	6 - mno
7 - pqrs	8 - tuv	9 - wxyz
* - + 66	0 -  67	# - ↑

Table 1. Layout of the alphanumeric keys 7.

Table 1 shows the layout of the alphanumeric key 7. When starting to type a word, the user simply presses the digit key containing the desired letter once. Fig. 6 second to fifth display shows how the user presses the following keys (once) in order to type the word "case":

"2 abc " to insert the "c"

"2 abc " to insert the "a"

"7 pqrs " to insert the "s"

"3 def " to insert the "e"

That means in total only four key-presses.

Often when typing the first few letters of a word, the predictive editor program is not yet able to display the intended characters and may erroneously display an unintended string of characters. These are therefore displayed as merely temporary characters in the display while the predictive editor program is evolving a match. When continuing the typing of the remaining characters in the word, the displayed characters will become more accurate. No matter what the display shows, the user simply types the next character in the word he wants to type.

During the inputting of a word to the predictive editor program, all the characters in the word are shown with underlining 74. This indicates that the word has not yet been finalised and all the characters shown underlined may still change as the predictive editor program evolves a match to the keypresses. As long as the entering of a word is in progress the already

entered part of the word remains underlined. It is furthermore seen that the softkey label 73 for the right softkey 24 changes to the "Clear" functionality.

The user accepts a word by pressing the space key (the key 67 –table 1), or by switching the predictive editor program off. When the user accepts a word this will be frozen meaning that the predictive editor program is no longer working on it and the marking 74 will be replaced the cursor bar 70. When spaces between words are deleted, the two words are concatenated into one, but the user is allowed to continue adding characters to the first word. In any situation, the word will be finally inserted, the text will no longer be underlined and the cursor 70 re–appears after the accepted word.

The user can delete characters backwards in a word by simply pressing the "Clear" key 9 once for each character to be deleted. The active word might in this situation also change based on the remaining key sequence. This is illustrated in fig. 10 where the suggested match "cas" in the display is changed to "ac" by deleting a key stroke and changed again to "can by pressing the "6 –mno" key.

If the user deletes a complete word, the phone return to the "initial word entry" mode, and the user can again type a new word.

If the user has typed a word and frozen the word by pressing the space key 67, and then clears this space after the word, then the cursor 70 will be placed at the end of the word but the predictive editor program will at this point no longer be active (the already entered word will not be underlined). If the user clears from this state, he will remove the last character of existing word, and then this word which was left of the cursor 70 will become underlined and active again.

Special characters.

While the predictive editor program is active, pressing the 1-key 65 will allow a smart insertion of punctuation. This means that the predictive editor program will try to predict, based on the situation, which commonly used punctuation mark, is intended. These may include the period, comma, question mark, exclamation point, and apostrophe. If the user e.g. wants to type the word "can't", he can simply press the following sequence:

"2 abc " to insert the "c"

"2 abc " to insert the "a"

"6 mno" to insert the "n"

"1" to insert the apostrophe

"8 tuv" to insert the "t"

The default value will most often suggest a period, if no other matches seem appropriate. The match function available on *-key 66 will also work in this situation, allowing the user to toggle through other choices like period, comma and similar special characters available on the 1-key 65.

Inserting digits can be done in two ways. First of all, long-pressing a digit in any situation will directly insert the corresponding digit into the editor. This is convenient when only inserting one or two digits. However, when entering a long string of digits then the menu "Options" has a submenu "Insert Number" that gives access to an insert number query window allowing the user to insert a string of digits. This is done by pressing the corresponding digit keys on the keypad for the numbers desired. After entering the desired number, the user presses an "OK" softkey and the text editing starts again.

The menu "Options" has another submenu "Insert Symbol" in which the user is given access to a plurality of symbols, characters and signs such as: @, \$, £ and letters not occurring in the language used in the dictionary. The user can scroll through the candidates by using the "*" -key 66.

Searching alternative matches.

In some situations, the key sequence typed by the user might allow several words to “fit”. In this situation, the predictive editor program will always first suggest the two most “common” words from the core dictionary. Here after all the whole word matches from the user dictionary will be shown, and finally all remaining matches from the core dictionary are shown. In many cases, the user might be looking for another word other than the immediately suggested one. There might be two or more possible matches to the key sequence. This is most often the case with short words.

The user can switch to other possible matches by pressing the *–key 66. This will immediately give the next possible match.

However the “options” softkey 25 will include a submenu called “matches” giving access to a list of matches the user can scroll through the list by pressing the left soft key 25 that will have the functionality “Next match”. The alternative match candidate will replace the active underlined word in the text and the alternative match candidate is selected in the same way as the default match candidate – e.g. by pressing the space-key 67. The list is handled as a loop. If no matches beyond what is already displayed then a note will be displayed saying “No Match Found”.

If there are several matches to the key–sequence typed by the user, pressing the *–key 66 will immediately give the next possible match (the second most common match). A specific match from the *–key 66 is finalized by finalising the word as usual e.g. by inserting a space.

When the left softkey 25 is used for matching purpose the right softkey 26 has and “Undo” functionality. This means when a match other than the default match is shown pressing the right softkey 26 will clear the match and revert to

the first match for that key sequence. Pressing the clear key 9 will undo a match, effectively backstepping one match.

If the cursor 70 is touching a word that is not underlined and therefore not active, pressing the *-key 66 will also make the word active again and offer the next match.

No matching word

If the predictive editor program runs out of possible word matches during the typing of a word, the display will show a unique error symbol 75; fig. 8, first display after the entered characters and the left Softkey 25 (fig. 5) will change functionality label 72 from "Options" to "Spell" providing a shortcut to the insert word query where the user can manually enter the desired word based on the multi tap editor normally used in the phones. The query should appear empty as seen in the second display of fig. 8. The user is allowed to enter letters by the well known multi-tap method in the position marked by the bar 76. The user accepts the word by pressing the left soft key 25 having the functionality label 72 whereby the editor returns to editing by using the predictive editor program.

When the phone has only a single softkey 8 as in fig. 1 the Softkey 8 will change from "Options" to "Insert" also providing the shortcut to the insert word query where the user can manually enter the desired word. The query should appear empty.

If the user continues to use the predictive editor program the last entered character will hence be displayed as an error symbol, to indicate to the user that no further possible words matches to the typed key sequence. The phone will emit a short alert beep to draw attention to indicate the lack of matches. If

the user types more keys in the situation the display will not show more characters and an information note saying "No Match Found" will be shown.

If the user finds out that he misspelled the word, he can simply press the "Clear" key 9, until the incorrect character can be changed. If the user chooses to accept a misspelled or unknown word e.g. by inserting space character, the error symbol will disappear, and the last recognised word will be inserted into the text.

Cursor movement.

Since the predictive editor program input method basically can only handle adding or deleting at the end of a word, the cursor handling is optimised for this.

Given the situation where the cursor is placed at the end of the text. By using the navigation key 28 for scrolling left the editor will activate the entire word to the left of the cursor 70, allowing the user to add additional characters to the word (using both the pre-existing word and the new key-presses to generate matches).

Scrolling left again will move the cursor 70 to the left of the word (the previously underlined word now no longer active for editing and therefore no longer underlined) and the editor is ready to type a new word.

Scrolling left again moves the cursor to the end of previous word, underlining it, allowing the user to add to that existing word. This cycle repeats when navigating through the text.

If the user moves the cursor through several consecutive spaces, the cursor will be moved one space at a time. Also, when moving through symbols, numbers, etc., the cursor is moved one character at a time.

If the user wants to add a new word to the end or beginning of an existing word by using the predictive editor program, this is simply done by first moving the cursor to the end or beginning of the existing word, respectively. From here, the user simply starts typing the new word.

The editor application opens the already written word for editing with the predictive editor program by placing the cursor in the desired position. Then the editor application regenerates the sequence of key strokes based on the presently displayed matching word. When the editor application adds new key strokes to the regenerated sequence of key strokes in dependence of the position of the cursor and the key pressed, this new string is used by the predictive editor program to find new matches.

If the user wants to edit an existing word by using the predictive editor program, this is done first by moving the cursor just after the word (activating the word in question causing it to be underlined). Then the user can directly add e.g. an ending to the word or if desired, can delete characters by pressing the clear key 9.

Whenever the "Insert Word" query is selected, by pressing OK softkey, the words that were entered in the query are added both to the user dictionary 41b as well as to the main editor window. A confirmation note "Word Saved" appears as well. Upon re-entry to the predictive editor program, insertion point will be after the last letter of the manually only spelled word.

Options lists

The “Option” menu in the predictive editor program will include some submenu items as:

- Matches
- Next Match
- Insert Word
- Insert Number
- Insert Symbol
- Dictionary

The match related items and the insert related items have already been discussed above. All languages supported by the predictive editor program for the phone will appear as choice items under “Dictionary” submenu item. The default language follows advantageously the display text language of the phone. This default may be to turn the predictive editor program off and revert to traditional input for the display text language when the predictive editor program does not include a dictionary supporting the language in question. Changing to another language will simply cause the predictive editor program to run in the new language. The user dictionary will not be affected by this.

User dictionary.

The predictive editor program supports a user dictionary, where words not initially known by the program can be stored. Any manually entered string of characters separated by a space will generate a new item in the user dictionary. When words are added to the user dictionary, they will become predictable by the predictive editor program thereafter. The storing of new words to the user dictionary is completely automatic, and is done whenever a new word is created. Only words not already in the core dictionary or the user dictionary will be added under the control of the prediction processor 62.

Words entered using the predictive editor program will already be in the core dictionary and will not need to be added to the user dictionary. However in some languages there exists a few cases where words should be added to the user dictionary. According to the preferred embodiment these cases shall be handled as follows:

- When the user creates a compound word in the predictive editor program, the word is added when the word is finalised.
- When the user deletes the space (or other delimiter) between two words, resulting in concatenation of these two words. The new word will then be added to the user dictionary after a timeout to avoid accidentally adding words when intention is editing.

Furthermore when names are saved in the phone book they will be linked to the user dictionary so they will be recognised as candidates by T9 when entering text.

When the phone 1 according to the preferred embodiment of the invention is started up or when a new SIM card has been inserted the full phonebook memory from the SIM card 16 is copied to the user directory 41c of the phone. On the SIM card 16 data is stored as preformatted records and these records are copied word by word into the user directory 41c.

For simplicity, the user dictionary is common for all languages. This means that the user dictionary can contain words that were added through the Insert Word submenu in many different languages. The size of a user dictionary will be limited by the available memory, so a user dictionary will be built up as a “cyclic” buffer, where the “oldest” words – when the buffer is full – will be automatically deleted when new words are added. A words creation date is reset each time it is used, so that even though a word was added to the

dictionary long time ago, it will not be deleted if frequently used. In summary, the first word to be deleted from the user dictionary will be a word that was added to the user dictionary a long time ago and has not been used much since.

In practice the processor 18 adds the storing time to the dictionary when a word is stored. This storing time will be updated the next time the processor 18 tries to add the same word.

Compound words.

In a further alternative embodiment shown in fig. 7, the navigation key 28 shown in fig. 5 is replaced by a roller key 29 having scroll up/down functionality and selection by pressing the roller body. This concept is described in the applicants pending US application 08/923.696 filed 4. September 1997. This application is hereby incorporated by reference. In this further alternative embodiment pressing of the roller body will accept the word as it is, and no space will be inserted after the word. This is especially useful to create compound words, which are important in many languages.

In many languages such as German and the Scandinavian languages you are allowed to create new words (compound words) by connecting standard words. The predictive editor program dictionary only contains very common compound words, so it will not guess a Danish word like e.g. "laserkavitetslængde" meaning "laser cavity length" in English. This is not a problem in English, since compound words hardly occur. But in Danish, German, Finnish etc, it is valuable for the user to type the compound words in parts by writing the first part of the compound word, then "freeze" this part, and then continue with the remaining part of the compound word.

Pressing the navigation key 29 (fig. 7) or rolling up once or rolling down once would remove the highlighting from under the current word and show the cursor at the end of the word, allowing then user to add additional characters with out changing the start of the compound word intended. The same will be obtained by scrolling left or right once by using the navigation key 10 (fig. 1) or 28 (fig. 5). Also, a short press of the power key 4 would also freeze the current word and allow easy creation of a compound word.

Fig 9 shows how the user has spelled the word 77 “steam”, and when this word is still active (underlined) he presses the navigation key 28 whereby the underlining disappears. When the user continues to enter letters only the letters 78 entered after the pressing of the navigation key 28 will be active. However when the entering is finalized the full word “steamlocomotive” will be displayed as a single word.

A further advantage of this concept is that the user when writing the word indicates where he wants to split (wrap the word) the full compound word if he has to split it over two lines in the display.

The basic editing concept is shown in fig. 11. When the predictive editor is started up the editor starts to wait for a key stroke in step 100. When a key stroke is detected it is added to a key stroke string and transferred to the predictive editor program in step 101. The predictive editor program responds to this input in step 102 and in step 103 the processor 18 investigates whether the predictive editor program could find possible matches.

If no possible matches is found in step 103 the last possible match is displayed in step 104 together with an error symbol (fig. 8, first display) and the functionality of the left soft key is changed to a short cut to the multi-tap spell mode.

If the user in step 105 accepts (by pressing the space key) the last possible match this word will be added to the text. Hereafter the key stroke string is cleared in step 106 and the editor starts to wait for a key stroke in step 100.

If the user in step 106 goes to the multi-tap spell mode he can enter the intended word in an unambiguous way (fig. 8, second display) in step 107. When accepting the entered word by pressing the left soft key 25 this word will be added to the text. Hereafter the key stroke string is cleared in step 106 and the editor starts to wait for a key stroke in step 100.

If the predictive editor program were able to find matches in step 103 the preferred one is displayed in step 108. In step 109 the next key stroke is read. In step 110 it is checked whether the user searches for alternative matches by pressing the "*" key 66. If this is the case the alternative match is displayed in step 111.

In step 112 it is checked whether the user accepts the displayed word by pressing the space key. If this is the case the word will no longer be active and will be added to the entered string of words in step 113. Hereafter the key stroke string is cleared in step 106 and the editor starts to wait for a key stroke in step 100.

If the key stroke is deemed to represent an ambiguous character the editor goes to step 101 for adding the key stroke to the key stroke string for looking for matches.

What is claimed is:-

PATENT CLAIMS

1. A communication terminal having:

- a display;
- a keypad having a plurality of keys associated with several letters each;
- processor means controlling the display means in accordance with the operation of the keypad;
- a predictive editor program for generating an output containing word matching a received string of ambiguous key strokes, said predictive editor program has a number of associated vocabularies including at least one language dependent dictionary and at least one dictionary receiving user defined inputs;
- an editor application controlled by the processor means communicates with said predictive editor programs for generating matching words based on an ambiguous string of key strokes;
- second memory means of the communication terminal for storing user inputted data in a electronic database;
- said processor means automatically searches said second memory means for words and copies these words into said at least one dictionary for receiving user defined inputs and associated with said predictive editor program.

2. A communication terminal according to claim 1 wherein said second memory means is an electronic phonebook database containing names and associated phone numbers.

3. A communication terminal according to claim 2 wherein said electronic phonebook database is stored on a Subscriber Identity Module in a cellular phone.

4. A communication terminal having:

- a display;
- a keypad having a plurality of keys associated with several letters each;
- processor means controlling the display means in accordance with the operation of the keypad;
- a predictive editor program for generating an output containing words matching a received string of ambiguous key strokes, said predictive editor program has a number of associated vocabularies including at least one language dependent dictionary and at least one dictionary receiving user defined inputs;
- an editor application controlled by the processor means communicates with said predictive editor programs for generating matching words based on an ambiguous string of key strokes, said editor application stores words that have to be entered in an unambiguous way in one of said least one dictionary receiving user defined inputs;
- said processor means associated a storing time for the unambiguously entered words stored in dictionary receiving user defined inputs; and
- said processor means maintains the dictionary containing the unambiguously entered words in dependence of the storing time.

5. A communication terminal according to claim 4 wherein the processor means updates the storing time every time the word is used by the editor application.

6. A communication terminal according to claim 5 wherein the dictionary containing the unambiguously entered words is built up as a cyclic buffer, where the word having the oldest storing time is removed from the memory when a new word is added and the buffer is full.

7. A communication terminal having:

- a display;

- a keypad having a plurality of keys associated with several letters each;
- processor means controlling the display means in accordance with the operation of the keypad;
- a predictive editor program for generating an output containing word matching a received string of ambiguous key strokes;
- an editor application controlled by the processor means for editing a text based on the predictive editor programs interpretation of key strokes, and comprising:
 - means for storing string of entered words,
 - means for storing a sequence of key strokes, said sequence is updated upon the occurrence of a new key stroke, and being used as input to the predictive editor program,
 - means for storing a list of matching words received from said predictive editor program,
- said processor means combines the text string and one word from the list of matching words for displaying in the display of at least a part of said text string and one word from the list of matching words, said one word from the list of matching words is marked in comparison to the remaining part of the text string and added to the text string upon acknowledgement by the user.

8. A communication terminal according to claim 7 wherein the keypad has a key for requesting the processor to replace said one word from the list of matching words, and said processor handling this list of matching words as and endless loop.

9. A communication terminal according to claim 7 wherein the a keypad has a key for requesting input of a special sign from a list of special signs in the text string, and wherein the a keypad has a key for requesting the processor to

replace a special sign with the next special sign from the list of special signs, and said processor handling this list of special signs as an endless loop.

10. A communication terminal according to claim 7 wherein the editor application opens a word for editing with the predictive editor program when a cursor is placed at the beginning or the ending of the word, whereby the editor application regenerates a sequence of key strokes based on the presently displayed match, and whereby the editor application adds new key strokes to the regenerated sequence of key strokes in dependence of the position of the cursor and the key pressed.

A communication terminal having a predictive editor application.

ABSTRACT.

A communication terminal having a display; a keypad having a plurality of keys associated with several letters each; processor means controlling the display means in accordance with the operation of the keypad; a selectable predictive editor program for generating an output containing words matching a received string of ambiguous key strokes, said predictive editor program has a number of associated vocabularies including at least one language dependent dictionary and at least one dictionary receiving user defined inputs. An editor application is controlled by the processor means communicates with said predictive editor programs for generating matching words based on an ambiguous string of key strokes. Second memory means of the communication terminal for storing user inputted data. The processor means automatically searches said second memory means for words and copies these words into said at least one dictionary for receiving user defined inputs and associated with said predictive editor program.

Fig. 3.

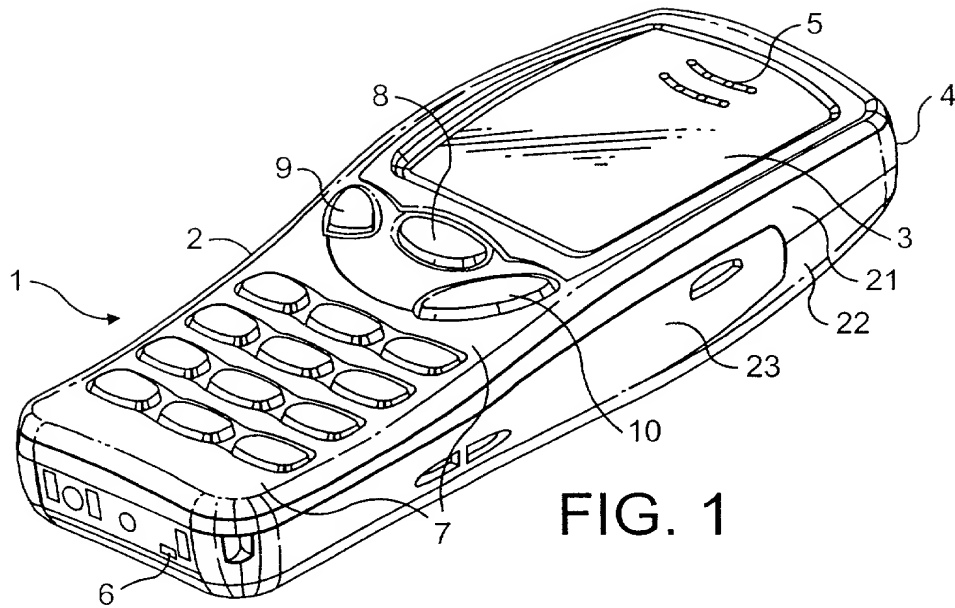


FIG. 1

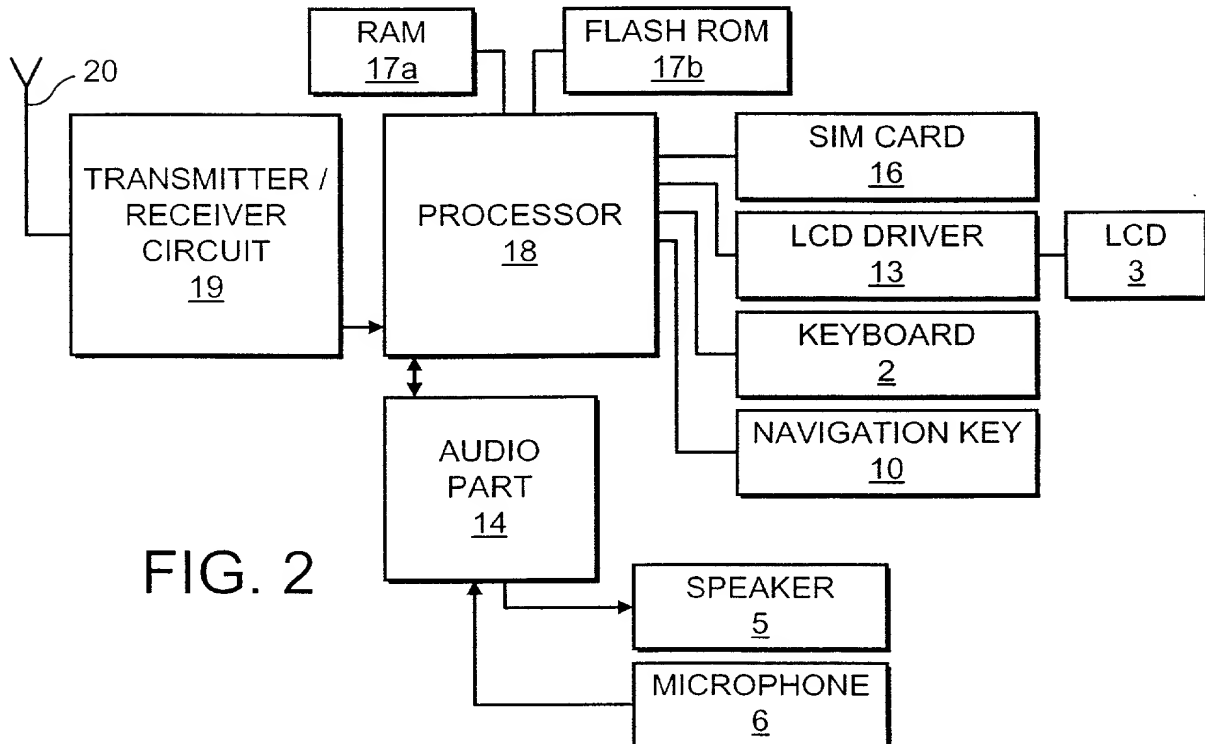


FIG. 2

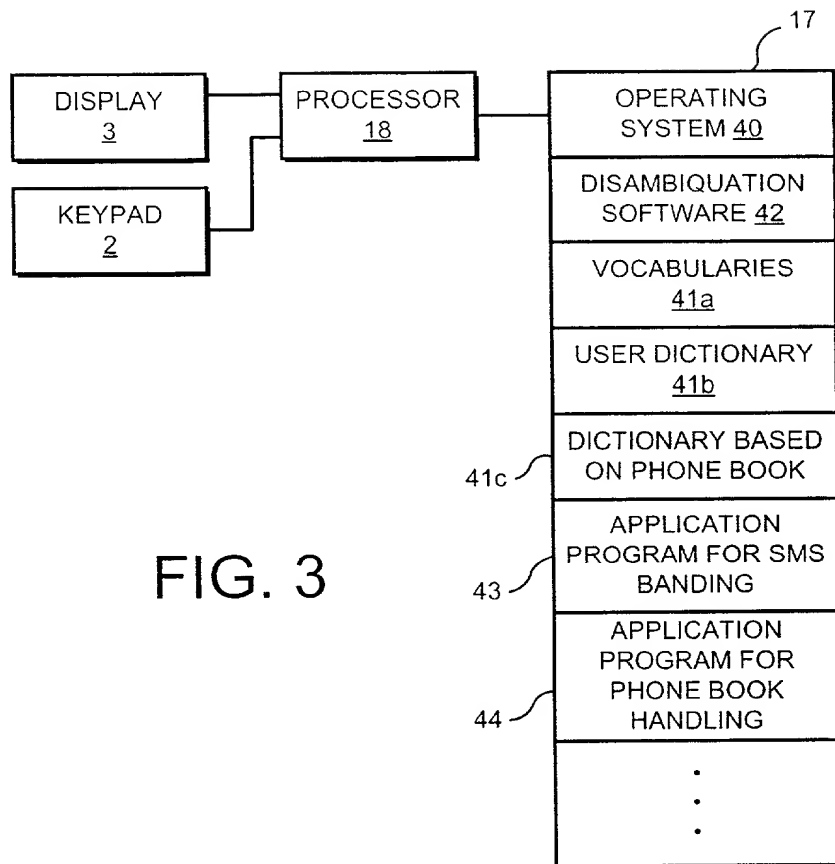


FIG. 3

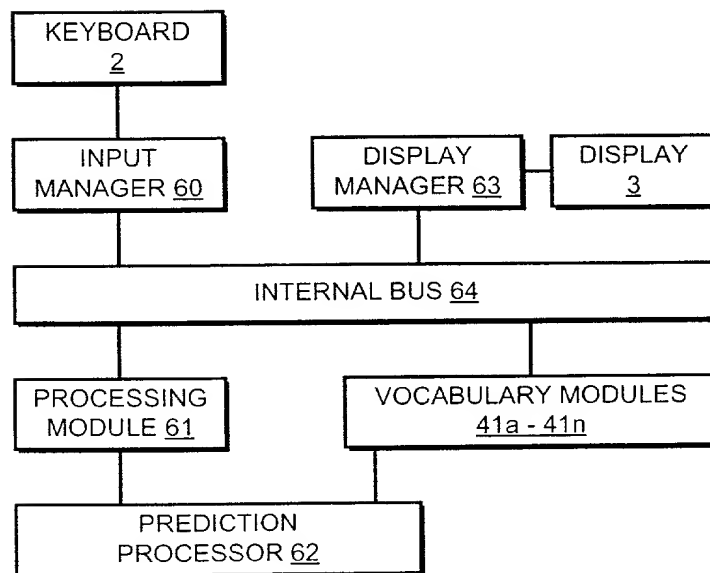


FIG. 4

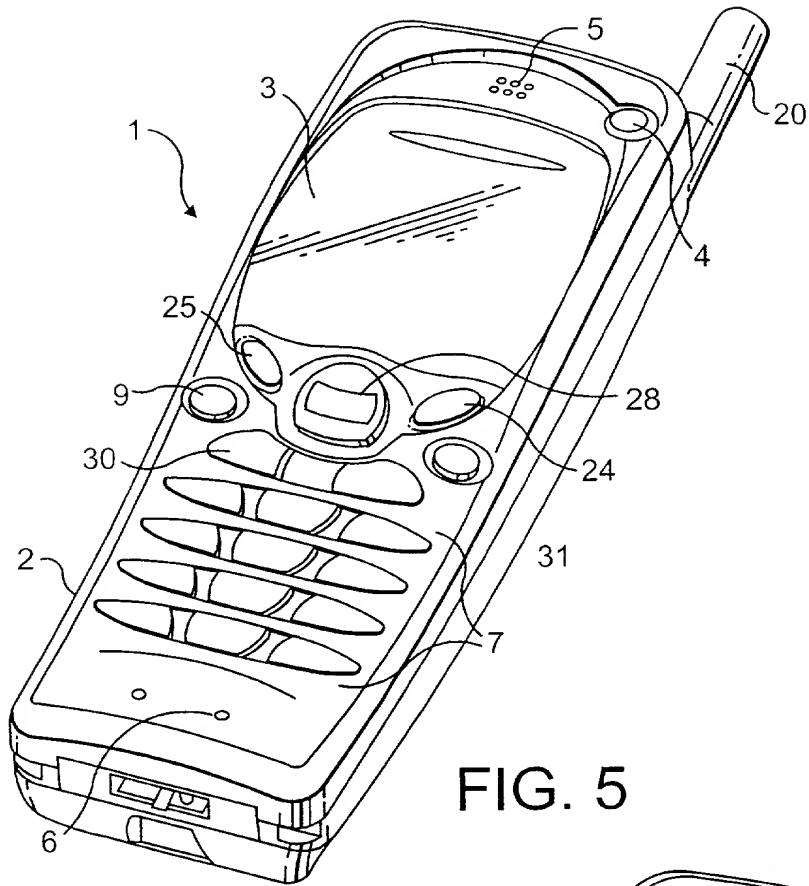


FIG. 5

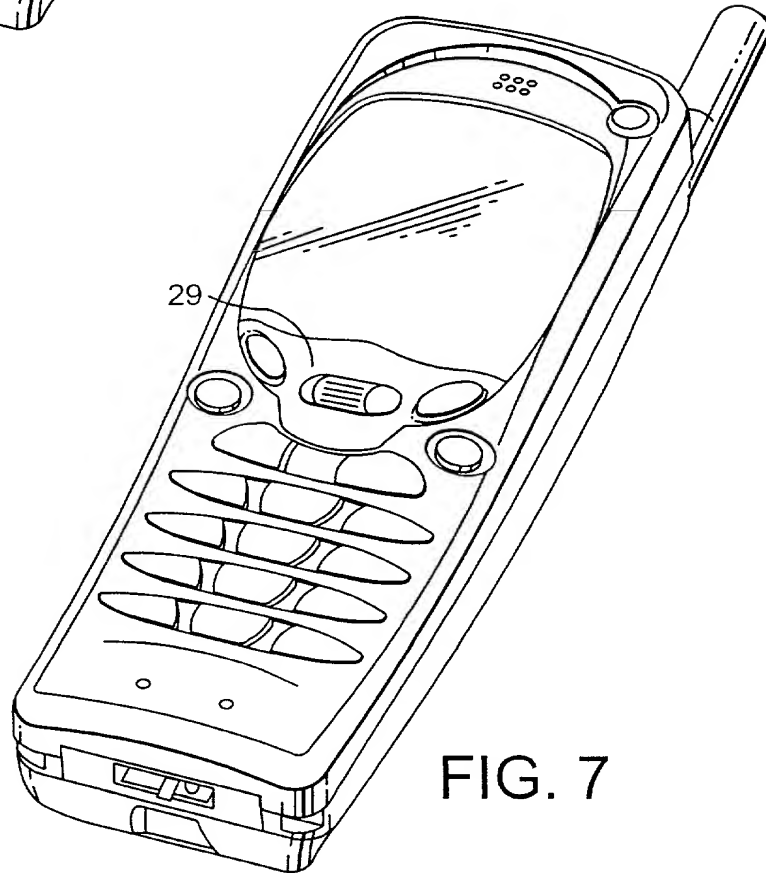


FIG. 7

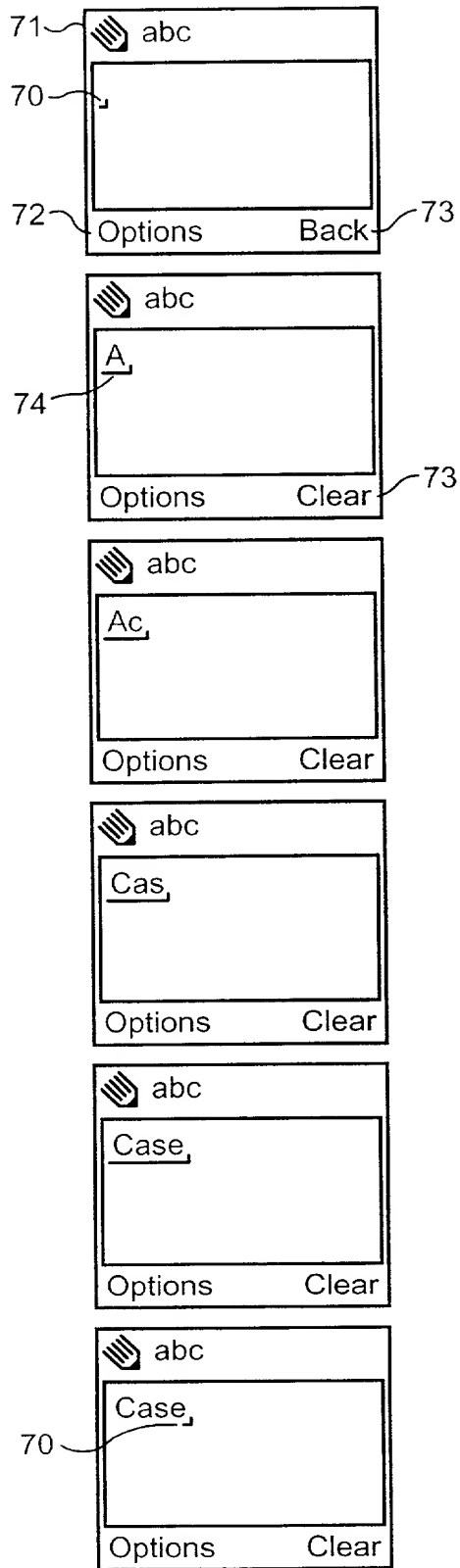


FIG. 6

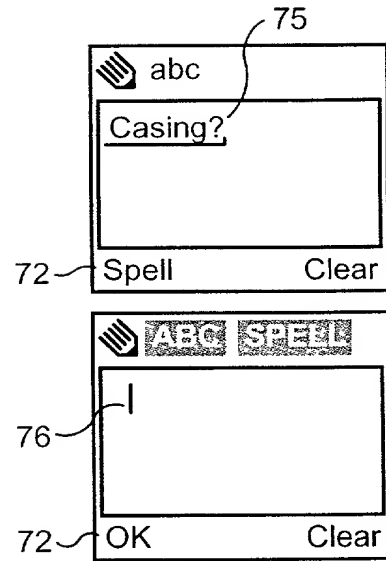


FIG. 8

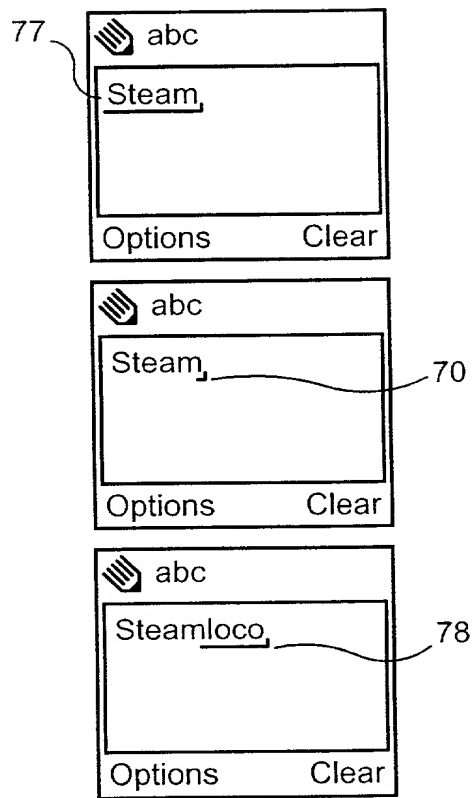


FIG. 9

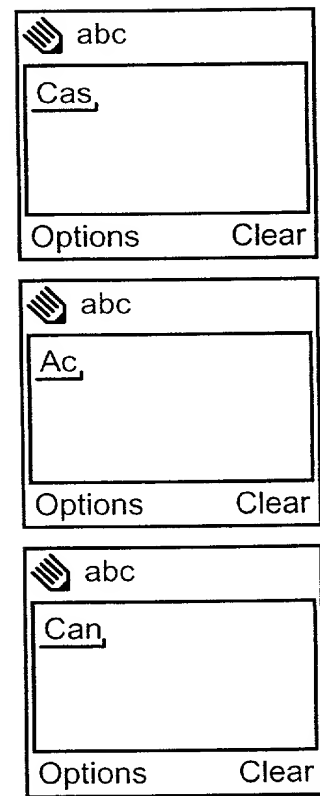


FIG. 10

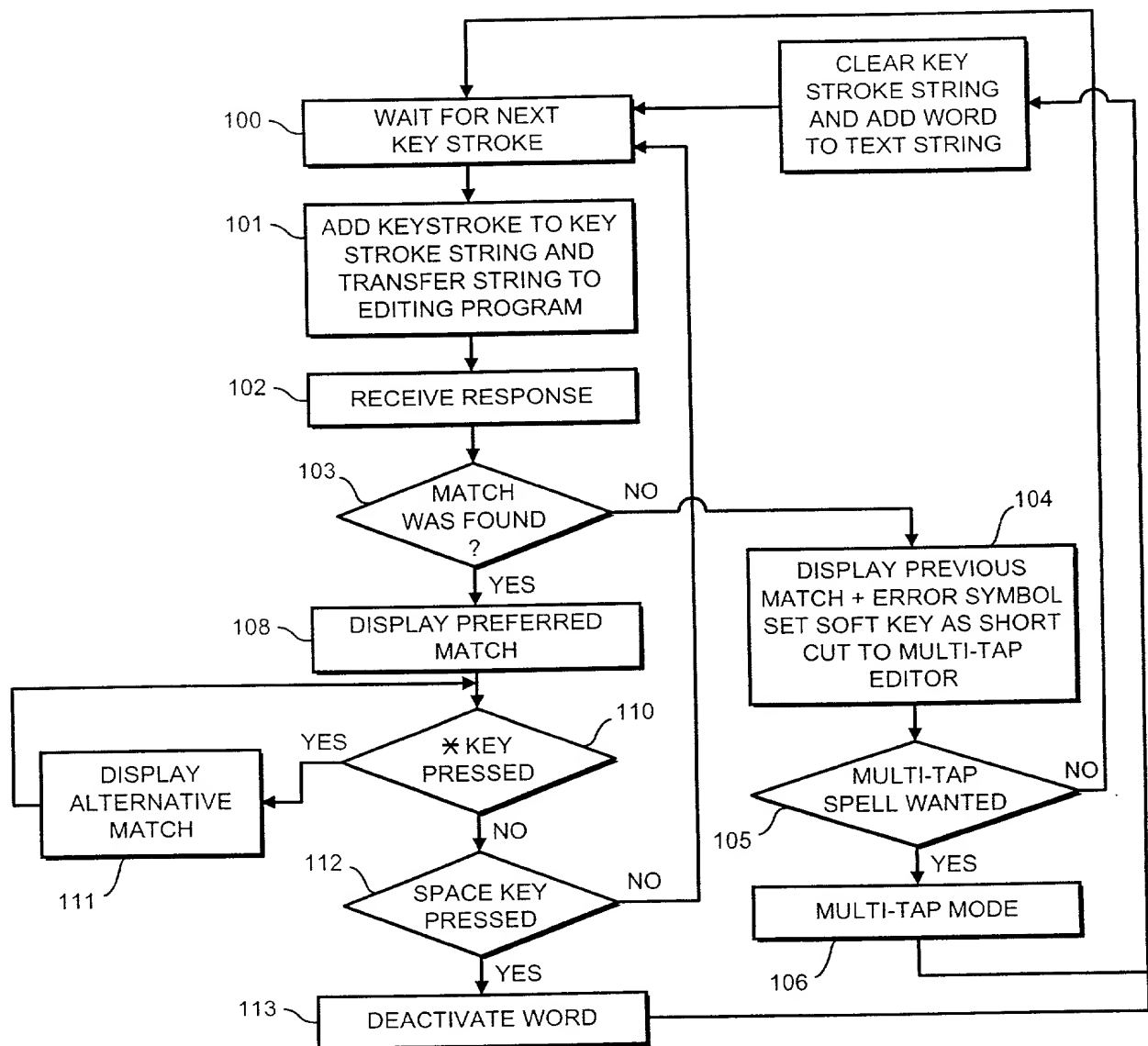


FIG. 11